

PATENT COOPERATION TREATY

REC'D 20 JUN 2005

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From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2005/050249

International filing date (day/month/year)
21.01.2005

Priority date (day/month/year)
24.01.2004

International Patent Classification (IPC) or both national classification and IPC
H01L29/45, H01L29/417, H01L21/336, H01L29/786

Applicant
KONINKLIJKE PHILIPS ELECTRONICS N.V.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - Gitschiner Str. 103
D-10958 Berlin
Tel. +49 30 25901 - 0
Fax: +49 30 25901 - 840

Authorized Officer

Juhl, A

Telephone No. +49 30 25901-768



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2005/050249

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
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International application No.
PCT/B2005/050249

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☒ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-12

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-12
	No: Claims	
Inventive step (IS)	Yes: Claims	5-9,12
	No: Claims	1-4,10,11
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations

see separate sheet

1. D1: US- A-5 801 398 (HEBIGUCHI ET AL) 1 September 1998 (1998-09-01),
D2: US-A-5 441 905 (WU ET AL) 15 August 1995 (1995-08-15),
D3: SHANNON J M ET AL: "SOURCE-GATED THIN-FILM TRANSISTORS" June 2003 (2003-06), IEEE ELECTRON DEVICE LETTERS, IEEE INC. NEW YORK, US, PAGE(S) 405-407 , XP001186748 ISSN: 0741-3106,
D4: US-A-3 943 552 (SHANNON ET AL) 9 March 1976 (1976-03-09).

2. Re Item IV

Lack of unity of invention

2.1 This Authority considers that there are three inventions covered by the claims indicated as follows:

I: Claims 1-12 are directed to a source gated transistor using a back exposure method step.

II. Claims 13-16 are directed to a source gated transistor with a heavily doped drain region.

2.2 The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

D3 is considered as closest prior art.

The special technical feature (STF1) of claim 1 with respect to D1 is a method step of back exposure through the substrate to define the source barrier. The objective problem

solved by this feature is the improved efficiency of the manufacturing method.

The special technical feature (STF2) of claim 13 is a highly doped drain region.

The objective problem solved by this feature is the formation of an ohmic contact with reduced resistance.

Both special technical features and problems are different and do not correspond to each other.

It is noted that the method of claim 1 does not automatically lead to a device according to claim 13.

3. Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-4,10,11 does not involve an inventive step in the sense of Article 33(3) PCT.

3.1.1 Present wording of claim 1 allows the Schottky source not only to be formed over the gate but also adjacent to the gate. Such a configuration corresponds however to that as known from D1 (cf. Figs.1,2). Since the back exposure technique is well known for patterning the source and drain (see e.g. Figs.3f-3i in D2), the subject matter of claims 1 and 3 does not involve an inventive step.

3.1.2 The use of spacers for avoiding overlaps is well known in the field of TFT technology and cannot contribute to inventive step, either (relevant to claim 2).

3.1.3 Field relief regions are known from D3 (cf. Fig.3) and cannot contribute to inventive step (relevant to claim 4).

3.1.4 The barrier lowering implant as claimed in dependent claims 10,11 is known from D4. Its inclusion in the method according to D3 and D4 is also obvious.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/IB2005/050249

3.2 In claim 1 it is not clear how the back exposure is used in order to define the barrier in the source layer (Article 6 PCT).

The subject matter of claim 5 is essential to the invention and should therefore be included in method claim 1. Such an amended claim would appear to be allowable in view of the available prior art.

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Box No. V Reasoned statement under Rule 43b/s.1(a)(I) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

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Both special technical features and problems are different and do not correspond to each other.

It is noted that the method of claim 1 does not automatically lead to a device according to claim 13.

3. Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-4,10,11 does not involve an inventive step in the sense of Article 33(3) PCT.

3.1.1 Present wording of claim 1 allows the Schottky source not only to be formed over the gate but also adjacent to the gate. Such a configuration corresponds however to that as known from D1 (cf. Figs.1,2). Since the back exposure technique is well known for patterning the source and drain (see e.g. Figs.3f-3i in D2), the subject matter of claims 1 and 3 does not involve an inventive step.

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3.2 In claim 1 it is not clear how the back exposure is used in order to define the barrier in the source layer (Article 6 PCT).

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